# Heat Stress Mitigation For Construction Projects

Department of Energy
Integrated Safety Management
Workshop
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#### Introduction

- Welcome
- Background of Project W-314
- Application and Success of ISMS to Project W-314



### **Speakers**

- Craig Upchurch
  - Radiological Controls Project
     Manager for the W-314 Project
- Rob Brooks
  - Lead Health Physics Technician for W-314



## W-314 Background

- Multi-year project to upgrade the Tank Farms at Hanford.
  - Initial Tank Farm construction was started in 1944.
  - 177 interconnected underground tanks ranging in size from 55,000 to 1.2 million gallons.
  - Store, retrieve, and dispose of liquid wastes from spent fuel processing.



## W-314 Background Cont.

- Upgrade of tank transfer lines and support systems to current engineering and environmental standards.
- Support clean-up of Hanford.
- Provide transfer route for final disposal to Vitirification Plant.



#### Hazards of W-314

- Construction hazards.
  - Trips and Falls.
  - Live loads (crane).
  - Excavations.
  - Heat, heat, heat and more heat.



#### W-314 Work Construction Site





#### W-314 Hazards

High risk of heat stress.

 Work productivity about 4 hours/day due to heat.



### **Identify Solutions**

- Meet with Workers and Industrial Safety & Health Professionals.
- Brainstorm Solutions.
- Analyze Solutions.
- Apply Solutions.
- Feedback and Improvement.



#### **Brainstorm Solutions**

Work graveyard shift.

Keep current work regimens.

Hire more personnel.



## **Analyze Solutions**

- Graveyard Shift.
  - Disruption of family and personal life.
  - Health problems, including gastrointestinal disorders and chronic fatigue.



## **Analyze Solutions Cont.**

- Keep current regimen.
  - Heat stress problems not resolved.
     Workers still at risk.
  - Schedule couldn't be met.



## **Analyze Solutions Cont.**

- Hire more workers.
  - Heat stress problems not resolved.
     Workers still at risk.
  - Less efficient. Current facilities unable to support more personnel.



#### **Best Solution**

- Keep current shift.
- Apply engineered controls.
  - Controls researched and developed by the workers who would use them.
  - Workers helped choose the brands of equipment utilized.
  - Increased satisfaction when workers are actively involved.



## **Engineered Controls**

- Cool vests.
- Air system developed by workers.
- Air vests for cooling.
  - Use of water resistant, breathable suits in lieu of plastic suits.
  - Supplied cool air through use of 55 gallon drums containing ice.



## **Engineered Controls Cont.**

- Soft hats with gel beads.
- Break areas.
  - Nearby work locations.
  - Water provided.
  - Shaded.



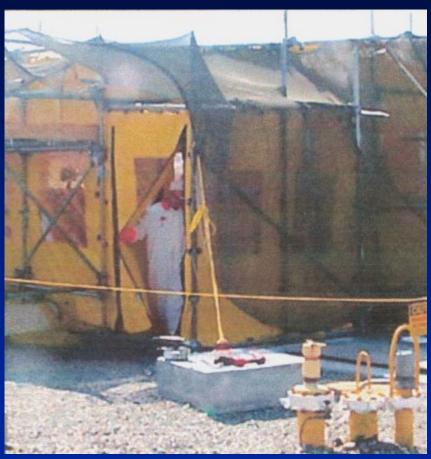
## **Engineered Controls Cont.**

- Shading of work locations and containment tents.
- Use of misters between the tent and shade.
- Use of demister fans to provide evaporative cooling to workers in the trenches.
- Use of air conditioning to containment tents.



## Implementation





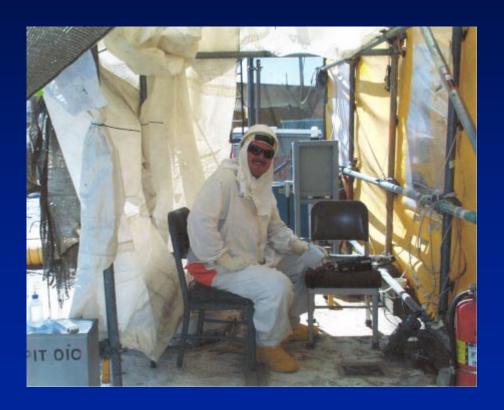


## Implementation Cont.





## Implementation Cont.





## Implementation Cont.





## Feedback and Plan for the Future

- Regardless of current success, strive for improvement next summer.
- Continue to solicit new ideas from workers and professionals.
- Do not become complacent.



## Feedback and Plan for the Future Cont.

- Provide atmosphere for safety improvement suggestions.
- Recognize the only bad idea was the one that wasn't suggested.



## Closing

 Working in a high heat environment can present unique challenges. Challenges that can be overcome by a commitment to listening and the application of the ISMS principles.

